DEFINING THE GOALS

> *"May the fact that I cannot understand 19/20 of your Electromagnetic Theory prevent me from congratulating you on the completion of Vol. II?" Editor, Oliver Heaviside's book on electromagnetic theory.*

Goals

The goals of NSF include *discovery, learning, research infrastructure and stewardship*. CMMI operates within these goals and assumes leadership and responsibility for their pursuit in the disciplinary areas of civil and mechanical infrastructure, materials transformation and mechanics, manufacturing, engineering design, dynamical systems and control, the service sector and industrial engineering. These NSF-wide goals translate into the following division objectives:

Objectives

In support of discovery:

1. *Encourage and enable innovative and high-quality research*. CMMI will conduct at least seven annual workshops for setting its research agenda. At least 2 percent of the division's discretionary research budget will be awarded through SGER proposals.

2. *Foster the emergence of new areas of research in fields relevant to the division*. CMMI will conduct an annual workshop to identify the most promising areas for advancement, and will choose an emphasis area for promotion of innovation. Three percent of the division's budget will be used to encourage research in the selected area.

3. *Enable and encourage research collaborations across disciplinary and geographical boundaries*. CMMI will continue to collaborate in ENG and NSF-wide initiatives. In addition, CMMI will conduct an annual workshop to identify discoveries and innovations emerging from its programs that will benefit most from small-group research, and will allocate three percent of its discretionary research budget to small-group research aimed at these discoveries.

In support of learning:

4. *Promote the support of students and encourage them to pursue advanced engineering educational opportunities*. CMMI will support REU and RET supplements, and will encourage the participation of women and minority students in particular by allowing REU supplements for two students per grant when at least one is a woman or minority. CMMI's objective is to have a representation of woman and minority REU students that is at least 50 percent

higher than their typical representations in undergraduate education typically.

5. *Reach out to and engage potential students and faculty across the entire diversity of the nation's society*. CMMI will conduct at least five outreach activities each year, with at least two of these activities consisting of workshops on developing proposals and research. Emphasis will be to reach women and minority groups as well as states participating in the Experimental Program to Stimulate Competitive Research (EPSCoR) program.

6. *Mentor young faculty members*. CMMI will seek to establish proposal review panels in which 20 percent are young faculty members. At least one biannual workshop will be aimed at mentoring minority faculty members. CMMI program directors will interact daily with various principal investigators (PIs) and prospective PIs, and the division will continue train its support staff to assure that callers can be referred to the appropriate program director for advice.

In support of research infrastructure:

7. *Maintain and further develop the George E. Brown Jr. Network for Earthquake Engineering Simulation (NEES) research*. CMMI supports the NEES network of facilities, enabling large-scale earthquake research. It will adhere to the NSF objectives for the operations of large-scale research infrastructure, keeping operating time lost due to unscheduled downtime to less than 10 percent of the total scheduled operating time for 90 percent of operational facilities.

8. *Support the establishment of extreme-event databases*. CMMI will enable data to be collected soon after extreme events, such as tsunamis, hurricanes and earthquakes for future scientific and engineering purposes. Such information is ephemeral and quick action is required to capture it. CMMI will provide funds through rapid allocation processes for collecting data on all important extreme events. CMMI will also continue to support continuous data collection to prepare for and assess risk and threat vulnerability in the face of such events.

9. *Major Research Instrumentation*. CMMI will continue to support provisioning research instrumentation to its PIs through funding from the MRI program. CMMI will inform its communities about the MRI program as a part of normal outreach activities.

In support of Stewardship:

10. *Promote the development of the academic research community*. Through its grantees conference, CMMI will encourage collaboration and development of research programs. The division looks to have at least 5 percent of proposals submitted to involve collaborations among many institutions.

11. *Engage a diverse group of reviewers who have specific expertise in the areas of the proposals they review and can provide high-quality proposal reviews*.

CMMI will maintain a level of diversity in proposal review panels and in other review processes equivalent to the gender and ethnic mix of experts in each respective research and education community. CMMI's goal is that no more than 70 percent of panelists will be used more than once each year, and that no one panelist will be used more than three times in a year.

12. *Conduct the division's affairs—particularly the merit review process, including decisions to grant or decline awards—in a manner that is unbiased, free of conflicts-of-interest, timely and transparent*. CMMI will develop and post on an internal Web site a set of best practices covering much of the proposal review and award process. CMMI will meet the Government Performance Results Act (GPRA) goals for proposal processing, and all conflicts will be handled appropriately.

13. *Enable easy communication with the outside community to alert the community about special opportunities, make NSF goals and procedures clear, and enable PIs to consult with program directors about research ideas, potential proposal opportunities, and results of the merit review process*. CMMI will conduct a grantees conference every 18 months to give grantees the opportunity to display their research, make connections with other grantees, and hear about CMMI's plans and initiatives for the forthcoming period.

14. *Recruit respected experts to serve as program directors.* CMMI will seek to obtain all new program directors who have a minimum of 10 years experience beyond the Ph.D. degree, equivalent to a tenured professor.

Values

Shared values of the CMMI personnel, consistent with those of ENG and NSF, include:

- Devotion to quality, both of internal operations and for the broader external community
- Promotion of personal growth and opportunity
- Respect for each other and the division's grantees and broader research community
- Honesty and openness in the work environment and all professional matters
- Responsibility to their position and the external community
- Protection of confidentiality when appropriate

These values enable division staff members to work together and discuss matters openly. Opinions of all division members are respected and heard, and decisions are made based on freely provided information. Disclosure of information is <u>never</u>

discouraged or punished.

Priorities: Achieving a Funding Balance

The seed corn in CMMI supported research lies in the innovate prowess of individual investigators. The bulk of innovation comes from individual investigator awards. However, the important and necessary research that develops nuggets of innovation into usable technologies often comes from the efforts of small, medium and, as the technology emerges, large groups. Thus, CMMI believes that its core programs and emphasis on individual investigator awards must be protected. This policy is not intended to de-emphasize group research, but rather to emphasize the need for balance between individual investigators and groups. The past several years have seen increased emphasis on group research. Emphasis should be on achieving the appropriate balance to ensure, if for no other reason, that groups will in the future have new technologies to address. These premises set CMMI's priorities given increases or decreases in its overall budget.

If CMMI's discretionary budget were to double, therefore, our priority would be first to strengthen the core programs to encourage innovation through individual investigator awards. Based on experience, the division can double the core budget, to enable more opportunities for research without jeopardizing the quality of awards. Second, we would identify initiatives that are key to advancement both in the disciplines that are the focus of CMMI's programs and those that cut broadly across the full range of engineering fields.